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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/035,346	12/28/2001	John de Q. Walker	01-152	1045

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LSI Logic Corporation
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Milpitas, CA 95035

EXAMINER

NADAV, ORI

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 11/20/2002

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/035,346

Applicant(s)

WALKER ET AL.

Examiner

ori nadav

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 11-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

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DETAILED ACTION

Election/Restriction

1. Applicant's election without traverse of Group I, claims 1-10 in Paper No. 8 is acknowledged.

Oath/Declaration

2. The oath/declaration filed on 01/02/98 is acceptable.

Drawings

3. The formal drawings filed on 01/02/1998 are acceptable.

Information Disclosure Statement

4. The Information Disclosure Statement filed on 03/05/2002 has been considered.

Claim Objections

5. Claims 3-7 are objected to because of the following informalities: The claimed equation of " $N=Bxm$ ", as recited in claim 3, line 3, should read " $N=Bxexp(m)$ ".

Appropriate correction is required.

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Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-2 and 8-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Stover et al. (3,914,708).

Regarding claims 1-2, Stover et al. teach in figure 2a and related text a varactor comprising: a diode junction 26/12; a depletion region (see figure 3) adjacent to the diode junction; and a doped region 12 (see figure 1c) including the depletion region and having a nonuniform dopant concentration profile that increases with increasing depth of the doped region from the diode junction 32, 46 (see figure 3); and wherein the nonuniform dopant concentration profile causes the varactor to have an approximately linear capacitance/voltage response characteristic (see figures 4a and 4b and column 6, lines 7-8), wherein: the doped region includes a peak dopant concentration region 34, 47 outside the depletion region (see figure 3); and the peak dopant concentration region forms a conductive path to and from the varactor.

Regarding claims 8-10, Stover et al. teach in figure 2a and related text a semiconductor substrate; a first side 10, 12 formed in the semiconductor substrate and being doped with a first type of dopant in a retrograde dopant profile (see figure 3); a second side 26

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formed in the semiconductor substrate adjacent the first side and being doped with a second type of dopant; and a depletion region (see figure 3) formed within a portion of the first side adjacent the second side upon applying a voltage bias between the first side and second side, the voltage bias also causing a capacitance between the first side and the second side that is linearly variable with the voltage bias (see figures 4a and 4b and column 6, lines 7-8), wherein: the retrograde profile of the first type of dopant in the first side includes an increasing dopant concentration 32, 46 with increasing depth from the second side to a peak concentration region 34, 47; and the peak concentration region functions as a conductive path to and from the varactor, and wherein the first side is a generally horizontal bottom side; and the second side is a top side generally parallel to the bottom side.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 3-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stover et al. in view of Sze.

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Regarding claims 3-5, Stover et al. teach substantially the entire claimed structure, as applied to claim 1 above, except stating that the nonuniform dopant concentration profile is defined by an equation $N=Bx^m$, where N is the dopant concentration, x is the depth of the doped region, B is a concentration constant and m is an exponent that determines the degree of curvature of the dopant profile, wherein m is about 3.

Sze teaches that a nonuniform dopant concentration profile is defined by the equation $N=Bx^m$, where N is the dopant concentration, x is the depth of the doped region, B is a concentration constant and m is an exponent that determines the degree of curvature of the dopant profile, wherein m is greater than zero.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a nonuniform dopant concentration profile defined by the equation $N=Bx^m$, where N is the dopant concentration, x is the depth of the doped region, B is a concentration constant and m is an exponent that determines the degree of curvature of the dopant profile, wherein m is about 3 in Stover et al.'s device, because the above equation is known to define a nonuniform dopant concentration profile, and in order to provide the closest characteristics to those of an ideal varactor, respectively.

Regarding claims 6-7, Stover et al. teach in figure 3 that B is in the range from about $1.0 \times 10^{13}/\text{cm}^3$ to about $1.0 \times 10^{19}/\text{cm}^3$, and about $1.0 \times 10^{16}/\text{cm}^3$.

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Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference B is cited as being related to varactor having a retrograde dopant profile.

Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is **(703) 308-8138**. The Examiner is in the Office generally between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas, can be reached at **(703) 308-2772**.

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Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**

A handwritten signature in black ink, appearing to read 'Ori Nadav', with a stylized, flowing script.

Ori Nadav

November 15, 2002